Claims

1. A handover method for providing a packet data service to a dual-band dual-mode mobile communication terminal having an asynchronous modem unit and a synchronous modem unit in a mobile communication network in which asynchronous and synchronous mobile communication systems coexist, the method comprising:

the first step of, as the mobile communication terminal in a dormant state with respect to the asynchronous mobile communication system moves into an area of the synchronous mobile communication system, a Serving General packet radio service (GPRS) Support Node (SGSN)/Gateway GPRS Support Node (GGSN) of the asynchronous mobile communication system receiving information indicating that handover is required;

the second step of the SGSN/GGSN commanding a base station of the synchronous mobile communication system to perform handover;

the third step of the mobile communication terminal attempting to originate a call to the base station, thus executing call processing and channel assignment between the base station and a mobile switching center of the synchronous mobile communication system;

the fourth step of performing a negotiation related to call processing and setup between the mobile communication terminal and the base station;

the fifth step of the synchronous mobile communication system setting up a trunk;

the sixth step of initializing a radio link protocol between the mobile communication terminal and the base station;

the seventh step of the base station notifying the mobile switching center that channel assignment has been completed;

the eighth step of setting up a packet data call between the mobile communication terminal and a packet data service node of the synchronous mobile communication system; and

the ninth step of the synchronous mobile communication system assigning a mobile IP to the mobile communication terminal.

2. The handover method according to claim 1, wherein the SGSN/GGSN is notified by a node B of the asynchronous mobile communication system or the base station of the synchronous mobile communication system that handover is required at the first step.

3. The handover method according to claim 1, wherein the SGSN/GGSN receives an identification number of the mobile communication terminal at the first step.

4. The handover method according to claim 1, wherein a message, including the handover command transmitted by the SGSN/GGSN to the mobile communication terminal at the second step, includes channel assignment information and traffic channel entry information.

5. The handover method according to claim 1, wherein the third step comprises the steps of:

the base station transmitting a service request message to the mobile switching center in response to the call origination attempt by the mobile communication terminal;

the mobile switching center requesting the base station to assign a channel; and

the base station transmitting a channel assignment message to the mobile communication terminal.

6. The handover method according to claim 1, wherein the fifth step comprises the steps of:

the base station requesting a packet controller of the synchronous mobile communication system to set up a trunk;

the packet controller requesting the packet data service node to set up a trunk, and receiving a reply to the trunk setup request; and

the packet controller transmitting a reply signal received from the packet data service node to the base station.

7. The handover method according to claim 1, wherein the ninth step comprises the steps of:

as the mobile communication terminal requests the packet controller of the synchronous mobile communication system to assign a mobile IP, the packet controller requesting an Authentication Authorization Account (AAA) unit of the synchronous mobile communication system to authenticate the mobile communication terminal;

the AAA unit verifying legality of the mobile communication terminal and transmitting results of legality verification to the packet data service node of the synchronous mobile communication system;

the packet data service node requesting a home agent of the synchronous mobile communication system to assign a mobile IP and receiving a reply to the request if the legality of the mobile communication terminal is verified; and

the packet data service node transmitting the mobile IP assigned by the home agent to the mobile communication terminal.

8. A handover method for providing a packet data service to a dual-band dual-mode mobile communication terminal having an asynchronous modem unit and a synchronous modem unit in a mobile communication network in which asynchronous and synchronous mobile communication systems coexist, the method comprising:

the first step of, as the mobile communication terminal that is connected to the asynchronous mobile communication system and using a packet data service moves into an area of the

synchronous mobile communication system, and a handover event occurs, a node B of the asynchronous mobile communication system notifying a Serving General packet radio service (GPRS) Support Node (SGSN)/Gateway GPRS Support Node (GGSN) of the asynchronous mobile communication system that handover is required;

the second step of the SGSN/GGSN requesting a mobile switching center of the synchronous mobile communication system to perform handover, and the mobile switching center requesting the base station of the synchronous mobile communication system to perform handover;

the third step of the synchronous mobile communication system performing a procedure of setting control signals and traffic for transmission of packet data;

the fourth step of the base station notifying the mobile switching center that handover has been completed, and assigning a forward channel to the mobile communication terminal;

the fifth step of the mobile switching center notifying the SGSN/GGSN that handover has been completed;

the sixth step of, as the SGSN/GGSN commands the node B to perform handover, the node B directing the mobile communication terminal to perform handover;

the seventh step of the mobile communication terminal notifying the base station that handover has been completed if a reverse channel has been assigned and a connection has been established between the mobile communication terminal and the synchronous mobile communication system;

the eighth step of the synchronous mobile communication system performing call setup for a packet data service;

the ninth step of the base station notifying the synchronous mobile switching center that handover has been completed, and the mobile switching center notifying the SGSN/GGSN that handover has been completed;

the tenth step of the SGSN/GGSN requesting the node B to release a connection to the mobile communication terminal;

the eleventh step of the mobile communication terminal establishing a PPP with the packet data service node of the synchronous mobile communication system; and

the twelfth step of assigning a mobile IP to the mobile communication terminal.

9. The handover method according to claim 8, wherein the third step comprises the steps of:

the base station requesting a packet controller of the synchronous mobile communication system to assign a channel;

the packet controller requesting location registration from the packet data service node of the synchronous mobile communication system and receiving results of the location registration request;

the packet data service node requesting location registration from the SGSN/GGSN and receiving a reply to the location registration request; and

the packet controller transmitting channel assignment information to the base station.

10. The handover method according to claim 8, wherein a message, including the handover direction transmitted by the node B to the mobile communication terminal at the sixth step, includes information used for channel assignment between the mobile communication terminal and the synchronous mobile communication system.

11. The handover method according to claim 8, wherein the eighth step comprises the steps of:

the base station requesting the packet controller of the synchronous mobile communication system to set up a call;

the packet controller requesting location registration from the packet data service node of

the synchronous mobile communication system and receiving results of the location registration request;

the packet data service node requesting location registration from the SGSN/GGSN and receiving a reply to the location registration request; and

the packet controller notifying the base station that call setup has been completed.

12. The handover method according to claim 8, wherein the twelfth step comprises the steps of:

the mobile communication terminal requesting the packet data service node to assign a mobile IP;

the packet data service node requesting a home agent of the synchronous mobile communication system to assign a mobile IP and receiving a reply to the mobile IP assignment request; and

the packet data service node transmitting the mobile IP assigned by the home agent to the mobile communication terminal.

13. A mobile communication system in which asynchronous and synchronous mobile communication systems coexist, the asynchronous mobile communication system including a node B functioning as a base station for wireless section communication with a dual-band dual-mode mobile communication terminal provided with an asynchronous modem unit and a synchronous modem unit, a radio network controller, a Serving General packet radio service (GPRS) Support Node (SGSN), and a Gateway GPRS Support Node (GGSN), the synchronous mobile communication system including a base station for supporting wireless section communication with the mobile communication terminal, a packet controller, a packet data service node, and a home agent, the mobile communication system

being capable of performing handover when the mobile communication terminal is using packet data service, wherein:

the home agent communicates with an IP network through an L1 layer for performing data coding and modulation, an L2 layer for processing replies for message transmission, and an IP layer, and communicates with the asynchronous and synchronous mobile communication systems through the L1 layer, the L2 layer and a layer for IP tunneling,

a protocol stack of the GGSN includes layers L1 and L2 corresponding to the layers L1 and L2 of the home agent, a User Datagram Protocol (UDP)/Internet Protocol (IP) layer for performing message exchange to correspond to the IP tunneling layer of the home agent, a GPRS Tunneling Protocol (GTP)-U layer for defining flow of packet data and information, and a Point-to-Point Protocol (PPP) layer for performing packet compression, authentication, IP assignment for data communication,

a protocol stack of the SGSN includes an L1bis layer corresponding to the L1 layer of the GGSN, an Asynchronous Transfer Mode (ATM) layer for performing generation, extraction and exchange of packet data to correspond to the L2 layer, a UDP/IP layer and a GTP-U layer,

a protocol stack of the node B/radio network controller includes an L1 layer corresponding to the L1bis layer of the SGSN, a Media Access Control (MAC) layer for assigning radio resources for multimedia data processing to correspond to the ATM layer, a Radio Link Control (RLC) layer for establishing a radio link with the mobile communication terminal and combining and dividing packet data to correspond to the UDP/IP layer, and a Packet Data Convergence Protocol (PDCP) layer for compressing a packet data header to correspond to the GTP-U layer, and

the asynchronous modem unit of the mobile communication terminal performs data communication using a protocol stack that includes a High-level Data Link Control (HDLC) framing layer for performing link management for link connection and disconnection, synchronization problem solution, flow control and error control to correspond to the MAC/RLC/PDCP layers of the node

B/radio network controller, and a PPP layer for receiving data through the PPP layer of the GGSN.

14. A mobile communication system in which asynchronous and synchronous mobile communication systems coexist, the asynchronous mobile communication system including a node B functioning as a base station for wireless section communication with a dual-band dual-mode mobile communication terminal provided with an asynchronous modem unit and a synchronous modem unit, a radio network controller, a Serving General packet radio service (GPRS) Support Node (SGSN), and a Gateway GPRS Support Node (GGSN), the synchronous mobile communication system including a base station for supporting wireless section communication with the mobile communication terminal, a packet controller, a packet data service node, and a home agent, the mobile communication system being capable of performing handover when the mobile communication terminal is using a packet data service, wherein:

the home agent communicates with an IP network through an L1 layer for performing data coding and modulation, an L2 layer for processing replies for message transmission, and an IP layer, and communicates with the asynchronous and synchronous mobile communication systems through the L1 layer, the L2 layer and a layer for IP tunneling,

a protocol stack of the GGSN includes layers L1 and L2 corresponding to the layers L1 and L2 of the home agent, a User Datagram Protocol (UDP)/Internet Protocol (IP) layer for performing message exchange to correspond to the IP tunneling layer of the home agent, and a GPRS Tunneling Protocol (GTP)-U layer for defining a flow of packet data and information,

a protocol stack of the SGSN includes an L1bis layer corresponding to the L1 layer of the GGSN, an Asynchronous Transfer Mode (ATM) layer for performing generation, extraction and exchange of packet data to correspond to the L2 layer, a UDP/IP layer and a GTP-U layer,

a protocol stack of the node B/radio network controller includes an L1 layer corresponding to the L1bis layer of the SGSN, a Media Access Control (MAC) layer for assigning radio

resources for multimedia data processing to correspond to the ATM layer, a Radio Link Control (RLC) layer for establishing a radio link with the mobile communication terminal and combining and dividing packet data to correspond to the UDP/IP layer, and a Packet Data Convergence Protocol (PDCP) layer for compressing a packet data header to correspond to the GTP-U layer, and

the asynchronous modem unit of the mobile communication terminal performs data communication using a protocol stack that includes a High-level Data Link Control (HDLC) framing layer for performing link management for link connection and disconnection, synchronization problem solution, flow control and error control to correspond to the MAC/RLC/PDCP layers of the node B/radio network controller.

15. The mobile communication system according to claim 13, wherein:

a protocol stack of the packet data service node connected to the home agent includes layers L1 and L2 corresponding to the layers L1 and L2, respectively, a UDP/IP layer for performing message exchange to correspond to the IP tunneling layer, a Generic Routing Encapsulation (GRE) layer for encrypting and compressing packets, and a Point-to-Point Protocol (PPP) layer for performing packet compression, authentication, IP assignment, etc. for data communication,

a protocol stack of the packet controller includes an L1bis layer corresponding to the L1 layer of the packet data service node, an Asynchronous Transfer Mode (ATM) layer for performing generation, extraction and exchange of packet data to correspond to the L2 layer, a UDP/IP layer, and a GRE layer,

a protocol stack of the base station includes an L1 layer corresponding to the L1bis layer of the packet controller, a Media Access Control (MAC) layer for assigning radio resources for multimedia data processing to correspond to the ATM layer, and a Radio Link Protocol (RLP) layer for requesting retransmission of erroneous frames to prevent errors from occurring in a wireless section to correspond to the UDP/IP layer, and the synchronous modem unit of the mobile

communication terminal performs data communication using a protocol stack that includes an L1 layer, a High-level Data Link Control (HDLC) framing layer for performing link management for link connection and disconnection, synchronization problem solution, flow control and error control to correspond to the MAC/RLP layers, and a PPP layer for receiving data through the PPP layer of the GGSN, and

a common module of the mobile communication terminal performs data communication through an L1 layer, a PPP layer, an IP layer, a transport layer and an application layer so as to convert protocols of data received from the asynchronous modem unit and the synchronous modem unit.

16. The mobile communication system according to claim 14, wherein:

a protocol stack of the packet data service node connected to the home agent includes layers L1 and L2 corresponding to the layers L1 and L2, respectively, a UDP/IP layer for performing message exchange to correspond to the IP tunneling layer, a Generic Routing Encapsulation (GRE) layer for encrypting and compressing packets, and a Point-to-Point Protocol (PPP) layer for performing packet compression, authentication, IP assignment, etc. for data communication,

a protocol stack of the packet controller includes an L1bis layer corresponding to the L1 layer of the packet data service node, an Asynchronous Transfer Mode (ATM) layer for performing generation, extraction and exchange of packet data to correspond to the L2 layer, a UDP/IP layer, and a GRE layer,

a protocol stack of the base station includes an L1 layer corresponding to the L1bis layer of the packet controller, a Media Access Control (MAC) layer for assigning radio resources for multimedia data processing to correspond to the ATM layer, and a Radio Link Protocol (RLP) layer for requesting retransmission of erroneous frames to prevent errors from occurring in a wireless section to correspond to the UDP/IP layer, and the synchronous modem unit of the mobile communication terminal performs data communication using a protocol stack that includes an L1 layer, a High-

level Data Link Control (HDLC) framing layer for performing link management for link connection and disconnection, synchronization problem solution, flow control and error control to correspond to the MAC/RLP layers, and a PPP layer for receiving data through the PPP layer of the GGSN, and

a common module of the mobile communication terminal performs data communication through an L1 layer, a PPP layer, an IP layer, a transport layer and an application layer so as to convert protocols of data received from the asynchronous modem unit and the synchronous modem unit.